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EXAMINER	
PERILLA, JASON M	
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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/670,054	Applicant(s) LAKKIS, ISMAIL A.
	Examiner Jason M Perilla	Art Unit 2634

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 25 September 2000 .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-26 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-8,11-24 and 26 is/are rejected.

7)☒ Claim(s) 9,10 and 25 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _____ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. Claims 1-26 are pending in the instant application.

Information Disclosure Statement

2. The information disclosure statement (IDS) submitted on September 9, 2000 is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Specification

3. The abstract of the disclosure is objected to because it contains duplicate sentences. An amended abstract should be submitted with corrections. Correction is required. See MPEP § 608.01(b).

4. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.

The following title is suggested: A CDMA/TMDA COMMUNICATION METHOD AND APPARATUS FOR WIRELESS COMMUNICATION USING CYCLIC SPREADING CODES.

Claim Objections

5. Claim 14 recites the limitation "the stream of data-conveying symbols" in line 6. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 5-8, and 23 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Regarding claim 5, the limitation that "the composite signal is responsive to symbols only from common blocks" on line 7 is not described in the specification. Further, application of such a limitation can not be enabled by one skilled in the art depending on the claim language alone. The definition of the term "common blocks" must be clarified.

Regarding claim 6, the combining activity as claimed in line 6 is not described in the specification and can not be enabled by one skilled in the art depending on the claim language alone. The particular method of combining as described in claim 6 must be enabled by the specification to one skilled in the art. A suggestion for amendment can not be made by the examiner because there is no basis of understanding for a suggestion.

Regarding claims 7 and 8, these claims are rejected to as being based upon parent claims that are not enabled.

Regarding claim 23, the combining section as claimed in line 6 is not described in the specification and can not be enabled by one skilled in the art depending on the claim language alone. The particular method of combining as described in claim 6 must be enabled by the specification to one skilled in the art. A suggestion for amendment

can not be made by the examiner because there is no basis of understanding for a suggestion.

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 6-7,12-13, 15,18, 20 and 23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 6, the dividing activity produces M unspread substreams blocks according to line 3 and each block is designated P in line 7. However, line 11 refers to "the P spread substreams" although P is understood to represent a block. Thus, the use of P and M are confused and do not allow for a clear and distinct claim of the invention.

Regarding claim 7, the claim is rejected to because it is based upon a parent claim that is indefinite.

Regarding claim 12, the use of the term "efficiency" in line 4 is not clear or distinct in the context of a matched filter. There is no basis of efficiency for either a matched or a mismatched filter in the specification. It is not possible to compare units of relative efficiency between two items that are not typically characterized by efficiency in the art.

Regarding claim 13, the use of the term "substantially" in line 4 regarding a flat spectral response does not distinctly claim how flat the spectral response is. A spectrum can not be clearly characterized as substantially flat.

Regarding claim 15, the use of "substantially" in line 6 regarding the occupation of a spectrum by a transmitter does not distinctly claim how much spectrum is occupied. The amount of spectrum occupied by a transmission can not be clearly quantified by the term substantially.

Regarding claim 18, the use of the term "efficiency" in line 5 is not clear or distinct in the context of a matched filter. There is no basis of efficiency for either a matched or a mismatched filter in the specification. It is not possible to compare units of relative efficiency between two items that are not typically characterized by efficiency in the art.

Regarding claim 20, the use of the term "substantially" in line 4 regarding a flat spectral response does not distinctly claim how flat the spectral response is. A spectrum can not be clearly characterized as substantially flat.

Regarding claim 23, the demultiplexer produces successive blocks of M symbols according to line 3. In line 6, the spreading section produces M spread substreams. In line 10 each block is designated as P. However, line 13 refers to "said P spread substreams" although P is understood to represent a block. Thus, the use of P and M are confused and do not allow for a clear and distinct claim of the invention.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 1, 13-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schilling et al (6078576) in view of Scott (6388997).

Regarding claim 1, Schilling et al disclose a method of operating a spread-spectrum-based wireless communication system to efficiently utilize spectrum in the presence of multipath (fig. 2; col. 2, lines 1-5) comprising, dividing a stream of data-conveying symbols into a plurality of unspread substreams (col. 4, lines 59-61) at a transmitter, generating a common spreading code at the transmitter (fig. 2, ref. 39; col. 4, lines 63-66), spreading each unspread substream using common spreading code to form a plurality of spread substreams (col. 4, lines 65-68), combining the plurality of spread substreams to form a composite signal (col. 5, lines 2-4), wirelessly transmitting a communication signal formed from the composite signal (col. 5, lines 7-10), receiving the communication signal at a receiver (col. 5, lines 41-45). Schilling et al discloses the use of a matched filter in the receiver (fig. 2, ref. 79). Schilling et al does not disclose despreading the communication signal at the receiver using a mismatched filter to generate a baseband signal. However, Scott teaches the advantages of the use of a mismatched filter (col. 47, lines 62-65). Because the mismatched filter reduces

sidelobes in the filter response, it is more robust against incorrect symbol decisions. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to utilize the mismatched filter with the benefits of sidelobe suppression as taught by Scott in the communication system of Schilling et al because sidelobe suppression is a benefit of the mismatched filter leading to correct symbol decisions.

Regarding claim 13, Schilling et al in view of Scott disclose the limitations of claim 1 as applied above. Further, it is inherent that spreading code exhibits a flat response. The term spreading code refers to code that exhibits a flat spectral response and is used to spread the spectral response of data having a frequency spectrum peak. The spreading section refers to common code that is a spreading code. Hence, the spreading section is configured so that the spectral analysis of the common code exhibits a flat response.

Regarding claim 14, Schilling et al in view of Scott disclose the limitations of claim 1 as applied above. Further, Schilling et al disclose a method of operating a spread-spectrum-based communication system wherein the receiver is a first receiver, the mismatched filter is a first mismatched filter, the baseband signal is a first baseband signal, and the method additionally comprises receiving the communication signal at a second receiver, despreading the communication signal in the second receiver using a second mismatched filter to generate a second baseband signal (col. 3, lines 24-29), generating a data stream as a time division multiple access (TDMA) stream having a plurality of time slots wherein a first one of the plurality of time slots is assigned to the

first receiver and a second one of the plurality of time slots is assigned to the second receiver (col. 3, lines 37-41), evaluating the first baseband signal at the first receiver to detect the first one of the time slots, and evaluating the second baseband signal at the second receiver to detect the second one of the time slots (col. 3, lines 45-50). Figure 1 shows a single transmitter and a plurality of receivers (refs. 31-35) each having a mismatched filter and generating a baseband signal. Each receiver evaluates a particular time slot as disclosed by Schilling et al because the signals between the receivers and transmitters are orthogonal in time (col. 3, 37-42) meaning that a single receiver will evaluate and transmit on a single time slot.

Regarding claim 15, Schilling et al in view of Scott disclose the limitations of claim 14 as applied above. Further, Schilling et al discloses a method of operating a spread-spectrum-based communication system wherein the transmitter is a first transmitter (fig. 1, ref. 30) and the communication signal is a first communication signal the first transmitter being configured so that the first communication signal occupies a spectrum and the first communication signal is detectable throughout a first radio coverage area, and additionally comprises transmitting a second communication signal from a second transmitter (col. 3, lines 24-28), the second communication signal occupying spectrum and being detectable throughout a second radio coverage area which is adjacent to the first radio coverage area. It is understood that a transmitter transmits a first communication signal that is detectable throughout a first coverage area, and a second transmitter transmits a second communication signal that is detectable throughout a second coverage area.

12. Claims 2-3, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schilling et al in view of Scott and in further view of Cafarella et al (5809060).

Regarding claim 2, Schilling et al in view of Scott disclose the limitations of claim 1 as applied above. Further, there are many types of different spreading codes used in direct sequence spread spectrum (DSSS). One skilled in the art is certainly aware of the use of particular spreading codes to enable many users of the same communication channel. Schilling et al in view of Scott do not disclose the spreading activity comprising temporally offsetting application of the common spreading code to the plurality of unspread substreams so that they correspond to unspread substreams modulated by cyclic variations of the common code. However, Cafarella et al does teach the benefits of using one temporally offset spread spectrum code to spread different data signals (col. 10, lines 3-5). Cafarella further teaches that the orthogonal codes created by the time shifted versions of a single spreading code have no projection on any other waveform in the set (col. 10, lines 44-46). Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to use time shifted versions of a single spreading code as taught by Cafarella et al among the plurality of data signals disclosed by Schilling et al in view of Scott because the cyclic time shifted versions of the spreading code provide nearly orthogonal cross correlation properties that are advantageous for multiple user communication systems.

Regarding claim 3, Schilling et al in view of Scott and in further view of Cafarella et al disclose the limitations of claim 2 as applied above. Further Schilling et al disclose a method of operating a spread-spectrum-based communication system wherein the

dividing activity produces successive blocks of symbols, where each block includes symbols concurrently present in each unspread substream, and each block has a block period (col. 4, lines 59-61). Because the demultiplexer means described by Shilling et al creates a plurality of data signals, it is inherent that these data signals are composed of successive blocks of symbols of arbitrary length and also having an arbitrary period. Schilling et al also discloses that the temporally offsetting and combining activities are mutually configured so that for a portion of each block period the composite signal is responsive to symbols from two different blocks (col. 5, lines 2-4). Because the combiner algebraically combines the plurality of spread signals, it is inherent that within a block period of arbitrary length the composite signal will be responsive to symbols from two different blocks at an arbitrary block period of the composite signal.

Regarding claim 11, Schilling et al in view of Scott and in further view of Cafarella et al disclose the limitations of claim 2 as applied above. Further, Cafarella discloses the use of cyclic variations of the common code and cyclic variations are also defined by a matrix in cyclic Toeplitz form. Because a cyclic Toeplitz matrix contains the cyclic variations of the same rows or common codes, it is obvious to apply the common codes as a cyclic Toeplitz form.

13. Claims 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schilling et al in view of O'Shea et al (6563856) and in further view of Cafarella et al.

Regarding claim 4, Schilling et al disclose a method of operating a spread-spectrum-based wireless communication system to efficiently utilize spectrum in the presence of multipath (fig. 2; col. 2, lines 1-5) comprising, dividing a stream of data-

conveying symbols into a plurality of unspread substreams (col. 4, lines 59-61) at a transmitter, generating a common spreading code at the transmitter (fig. 2, ref. 39; col. 4, lines 63-66), spreading each unspread substream using common spreading code to form a plurality of spread substreams (col. 4, lines 65-68), combining the plurality of spread substreams to form a composite signal (col. 5, lines 2-4), wirelessly transmitting a communication signal formed from the composite signal (col. 5, lines 7-10), receiving the communication signal at a receiver (col. 5, lines 41-45). Schilling et al discloses the use of a matched filter in the receiver (fig. 2, ref. 79). Schilling et al does not disclose the use of a sidelobe suppressor with the matched filter. However, O'Shea et al teaches the use of a matched filter and a sidelobe suppressor in a receiver (fig. 5B; col. 4, lines 43-45). The benefit of the sidelobe suppressor is well known in the art because it helps to avoid incorrect signal decisions. Therefore, it would have been obvious to one of ordinary skill in the art at the time which the invention was made to utilize the sidelobe suppressor as taught by O'Shea et al in the wireless communication system of Schilling et al because the sidelobe suppressor results in more robust symbol determination by suppressing undesirable sidelobes. Moreover, there are many types of different spreading codes used in direct sequence spread spectrum (DSSS). One skilled in the art is certainly aware of the use of particular spreading codes to enable many users of the same communication channel. Schilling et al in view of O'Shea et al does not disclose the spreading activity comprising temporally offsetting application of the common spreading code to the plurality of unspread substreams so that they correspond to unspread substreams modulated by cyclic variations of the common

code. However, Cafarella et al does teach the benefits of using one temporally offset spread spectrum code to spread different data signals (col. 10, lines 3-5). Cafarella further teaches that the orthogonal codes created by the time shifted versions of a single spreading code have no projection on any other waveform in the set (col. 10, lines 44-46). Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to use time shifted versions of a single spreading code as taught by Cafarella et al among the plurality of data signals disclosed by Schilling et al in view of O'Shea et al because the cyclic time shifted versions of the spreading code provide nearly orthogonal cross correlation properties that are advantageous for multiple user communication systems. Additionally, Schilling et al discloses a method of operating a spread-spectrum-based communication system wherein the dividing activity produces successive blocks of symbols, where each block includes symbols concurrently present in each unspread substream, and each block has a block period (col. 4, lines 59-61). Because the demultiplexer means described by Shilling et al creates a plurality of data signals, it is inherent that these data signals are composed of successive blocks of symbols of arbitrary length and also having an arbitrary period. Schilling et al also discloses that the temporally offsetting and combining activities are mutually configured so that for a portion of each block period the composite signal is responsive to symbols from two different blocks (col. 5, lines 2-4). Because the combiner algebraically combines the plurality of spread signals, it is inherent that within a block period of arbitrary length the composite signal will be

responsive to symbols from two different blocks at an arbitrary block period of the composite signal.

14. Claims 16 and 20-22, 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Schilling et al in view of Cafarella et al.

Regarding claim 16, Schilling et al discloses a spread-spectrum-based communication system which efficiently utilizes spectrum in the presence of multipath (fig. 2; col. 2, lines 1-5) comprising, a demultiplexer for dividing a stream of data-conveying symbols into a plurality of unspread substreams (fig. 2, ref. 44; col. 4, lines 59-61), a spreading section coupled to the demultiplexer and configured to generate spread substreams from the plurality of unspread substreams (fig. 2, refs. 39, 51, & 58; col. 4, lines 65-68), a combining section coupled to the spreading section and configured to form a composite signal in response to the spread substreams (fig. 2, ref. 45; col. 5, lines 2-4), a transmission section coupled to the combining section and configured to wirelessly transmit a communication signal formed from the composite signal (fig. 2, ref. 50; col. 5, lines 7-10), a receiving section configured to receive the communication signal (col. 5, lines 41-45), and a despreading section coupled to the receiving section configured to generate a baseband signal in response to the communication signal (fig. 2, refs. 71 & 78). Schilling et al does not disclose that the spread substreams generated in the transmitter correspond to respective ones of the unspread substreams modulated by cyclic variations of a common spreading code. However, Cafarella et al does teach the benefits of using one temporally offset spread spectrum code to spread different data signals (col. 10, lines 3-5). Cafarella further

teaches that the orthogonal codes created by the time shifted versions of a single spreading code have no projection on any other waveform in the set (col. 10, lines 44-46). Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to use time shifted versions of a single spreading code as taught by Cafarella et al among the plurality of data signals disclosed by Schilling et al because the cyclic time shifted versions of the spreading code provide nearly orthogonal cross correlation properties that are advantageous for multiple user communication systems.

Regarding claim 20, Schilling et al in view of Cafarella et al disclose the limitations of claim 16 as applied above. Further, it is inherent that spreading code exhibits a flat response. The term spreading code refers to code that exhibits a flat spectral response and is used to spread the spectral response of data having a frequency spectrum peak. The spreading section refers to common code that is a spreading code. Hence, the spreading section is configured so that the spectral analysis of the common code exhibits a flat response.

Regarding claim 21, Schilling et al in view of Cafarella et al disclose the limitations of claim 16 as applied above. Further, Schilling et al discloses a spread-spectrum-based communication system additionally comprising a time division multiple access (TDMA) modulation section coupled to the demultiplexer (fig. 2, ref. 42), the TDMA modulation section being configured so that the communication signal is a TDMA signal for which recipients are distinguished from one another by being assigned to different time slots (col. 3, lines 37-42.)

Regarding claim 22, Schilling et al in view of Cafarella et al disclose the limitations of claim 12 as applied above. Further Shilling et al discloses a spread-spectrum-based communication system wherein the transmission section is a first transmission section, the communication signal is a first communication signal (fig. 1, col. 3, lines 24-30), the communication system has first and second adjacent radio coverage areas with the first communication signal being transmitted to the first adjacent radio coverage area and the communication system additionally comprises a second transmission section configured to transmit a second communication signal to the second adjacent radio coverage area (fig. 1, col. 3, lines 24-30), the first and second communication signals being transmitted using a common spectrum. Schilling et al discloses that there can be several base stations (transmitters) (col. 3, line 29). It is inherent that the first transmitter transmits in a first radio coverage area and the second transmitter transmits in the second radio coverage area. It is also inherent that the first and the second transmitters are adjacent and that the first and second communication signals are transmitted on the common RF spectrum.

Regarding claim 26, Schilling et al discloses a time division multiple access (TDMA), spread spectrum based communication system which efficiently utilizes spectrum in the presence of multipath (fig. 2; col. 2, lines 1-5) comprising, a plurality of transmitters configured to wirelessly transmit TDMA (col. 3, lines 18-21) communication signals which convey messages in adjacent radio coverage areas, a plurality of receivers located in adjacent radio coverage areas (fig. 1, refs. 31-35) wherein each receiver is configured to detect ones of the messages intended for each receiver by

identifying time slots assigned to each receiver (col. 3, lines 45-50). Schilling et al also discloses that each of the transmitters comprises, a demultiplexer (fig. 2, ref. 44) for dividing a TDMA stream of data-conveying symbols into a plurality of unspread substreams, a spreading section coupled to the demultiplexer and configured to generate spread substreams from said plurality of unspread substreams (fig. 2, ref 39), a combining section (fig. 2, ref. 45) coupled to the spreading section and configured to form a composite signal in response to the spread substreams, a transmission section coupled to the combining section and configured to transmit one of the TDMA communication signals formed from the composite signal (fig. 2, ref 50). Schilling et al further discloses that each of said receivers comprises, a receiving section configured to receive one of said TDMA communication signals (fig. 2, ref. 61) and a despreading section coupled to said receiving section (fig. 2, ref 71 & 78), said despreading section being configured to generate a baseband signal in response to said TDMA communication signal (col. 5, lines 41-45). Schilling et al does not disclose that the spreading section is configured so that said spread substreams correspond to respective ones of said unspread substreams modulated by cyclic variations of a common spreading code. However, Cafarella et al does teach the benefits of using one temporally offset spread spectrum code to spread different data signals (col. 10, lines 3-5). Cafarella further teaches that the orthogonal codes created by the time shifted versions of a single spreading code have no projection on any other waveform in the set (col. 10, lines 44-46). Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to use time shifted versions of a

single spreading code as taught by Cafarella et al among the plurality of data signals disclosed by Schilling et al because the cyclic time shifted versions of the spreading code provide nearly orthogonal cross correlation properties that are advantageous for multiple user communication systems.

15. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schilling et al in view of Cafarella et al and in further view of Scott.

Regarding claim 17, Schilling et al in view of Cafarella et al disclose the limitations of claim 16 as applied above. Schilling et al in does disclose the use of a matched filter in the receiver (fig. 2, ref. 79). Schilling et al does not disclose that the despreading section at the receiver comprises a mismatched filter. However, Scott teaches the advantages of the use of a mismatched filter (col. 47, lines 62-65). Because the mismatched filter reduces sidelobes in the filter response, it is more robust against incorrect symbol decisions. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to utilize the mismatched filter with the benefits of sidelobe suppression as taught by Scott in the communication system of Schilling et al because sidelobe suppression is a benefit of the mismatched filter leading to correct symbol decisions.

16. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schilling et al in view of Cafarella et al and in further view of O'Shea et al.

Regarding claim 19, Schilling et al discloses a spread-spectrum-based communication system which efficiently utilizes spectrum in the presence of multipath (fig. 2; col. 2, lines 1-5) comprising, a demultiplexer for dividing a stream of data-

conveying symbols into a plurality of unspread substreams (fig. 2, ref. 44; col. 4, lines 59-61), a spreading section coupled to the demultiplexer and configured to generate spread substreams from the plurality of unspread substreams (fig. 2, refs. 39, 51, & 58; col. 4, lines 65-68), a combining section coupled to the spreading section and configured to form a composite signal in response to the spread substreams (fig. 2, ref. 45; col. 5, lines 2-4), a transmission section coupled to the combining section and configured to wirelessly transmit a communication signal formed from the composite signal (fig. 2, ref. 50; col. 5, lines 7-10), a receiving section configured to receive the communication signal (col. 5, lines 41-45), and a despreading section coupled to the receiving section configured to generate a baseband signal in response to the communication signal (fig. 2, refs. 71 & 78). Schilling et al does not disclose that the spread substreams generated in the transmitter correspond to respective ones of the unspread substreams modulated by cyclic variations of a common spreading code. However, Cafarella et al does teach the benefits of using one temporally offset spread spectrum code to spread different data signals (col. 10, lines 3-5). Cafarella further teaches that the orthogonal codes created by the time shifted versions of a single spreading code have no projection on any other waveform in the set (col. 10, lines 44-46). Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to use time shifted versions of a single spreading code as taught by Cafarella et al among the plurality of data signals disclosed by Schilling et al because the cyclic time shifted versions of the spreading code provide nearly orthogonal cross correlation properties that are advantageous for multiple user

communication systems. Additionally, Schilling et al discloses a spread-spectrum-based communication system wherein the demultiplexer produces successive blocks of symbols, where each block includes symbols concurrently present in each unspread substream, and each block has a block period (col. 4, lines 59-61). Because the demultiplexer means described by Shilling et al creates a plurality of data signals, it is inherent that these data signals are composed of successive blocks of symbols of arbitrary length and also having an arbitrary period. Schilling et al also discloses that the spreading section is configured so that for a portion of each block period the composite signal is responsive to symbols from two different blocks (col. 5, lines 2-4). Because the combiner algebraically combines the plurality of spread signals, it is inherent that within a block period of arbitrary length the composite signal will be responsive to symbols from two different blocks at an arbitrary block period of the composite signal. Moreover, Schilling et al discloses the use of a matched filter in the receiver (fig. 2, ref. 79). Schilling et al in view of Cafarella et al does not disclose a matched filter combined with a sidelobe suppression filter. However, O'Shea et al teaches the use of a matched filter and a sidelobe suppressor in a receiver (fig. 5B; col. 4, lines 43-45). The benefit of the sidelobe suppressor is well known in the art because it helps to avoid incorrect signal decisions. Therefore, it would have been obvious to one of ordinary skill in the art at the time which the invention was made to utilize the sidelobe suppressor as taught by O'Shea et al in the wireless communication system of Schilling et al because the sidelobe suppressor results in more robust symbol determination by suppressing undesirable sidelobes.

17. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Schilling et al in view of Cafarella et al and in further view of He et al (6081562).

Regarding claim 24, Schilling et al in view of Cafarella et al disclose the limitations of claim 16 as applied above. Schilling et al in view of Cafarella et al do not disclose that a maximum likelihood sequence estimation (MLSE) equalizer is coupled downstream the dispreading section to compensate for multipath. The use of MLSE equalizers is very common in the art. Further, He et al teaches the benefits of a MLSE equalizer (col. 1, lines 11-15). He et al teaches that the use of an MLSE equalizer contributes to a significant performance gain for detection of symbols. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a MLSE equalizer as described by He et al in the receiver because it would benefit the detection of symbols in the receiver.

Allowable Subject Matter

18. Claims 9-10, and 25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following prior not relied upon above is cited to further show the state of the art with respect to wireless communications using and DSSS modulation techniques.

U.S. Pat. No. 6141374 to Burns; Shifted PN code CDMA.

U.S. Pat. No. 6430170 to Saints et al; Shifted PN code DSSS.

U.S. Pat. No. 6215777 to Chen et al; CDMA/OFDM communication.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M Perilla whose telephone number is (703) 305-0374. The examiner can normally be reached on M-F 8-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Chin can be reached on (703) 305-4714. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 306-0377.

Jason M Perilla
November 2, 2003

jmp